

REMARKS

Claims 12-22 are pending in the present application. Claims 21 and 22 have been withdrawn from consideration by restriction. Claim 12 has been amended to accurately reflect the flux that is being added in the process. Support for this amendment can be found in the as-filed specification at p. 4, lines 20-22. In addition, the paragraph beginning at page 4, line 20 of the specification has been amended to correct an obvious typographical error that was present in the as-filed specification. No new matter has been added to the application. Reexamination of the application and reconsideration of the rejections and objections are respectfully requested in view of the above amendments and the following remarks, which follow the order set forth in the Office Action (“the Action”).

Claim Objections

Claim 14 is objected to under 37 CFR 1.75(c) as allegedly being in improper dependent form for failing to further limit the subject matter of a previous claim. Applicants respectfully traverse. Claim 14 is dependent on claim 13, which is dependent on claim 12, and recites “wherein only one or both of dolomite and limestone are added as a flux.” The Office Action correctly states that dolomite is $\text{CaCO}_3 \cdot \text{MgCO}_3$. The specification is amended concurrently herewith to correct an obvious typographical error in the definition of dolomite. In particular, in the as-filed specification, a comma was inadvertently placed between CaCO_3 and MgCO_3 in the definition of dolomite. The amendment replaces the comma with a dot between the two compounds in the definition of dolomite. Thus, as the amended specification and the Office Action state, dolomite is $\text{CaCO}_3 \cdot \text{MgCO}_3$. However, the Office Action incorrectly states that limestone is Ca(OH)_2 . In fact, limestone is CaCO_3 , as stated in the as-filed specification at page 4, line 20. In addition to the amendment to the specification, claim 12 is also amended concurrently herewith to recite that either one or more of CaCO_3 , SiO_2 and MgCO_3 are added as a flux in the claimed process. Accordingly, claim 14, which is indirectly dependent on amended claim 12, and which states “wherein only one or both of dolomite and limestone are added as a flux” does, in fact, further limit the subject matter of a previous claim. Based on the foregoing, Applicants respectfully request reconsideration and withdrawal of the instant objection.

Rejections under 35 U.S.C. §103

Claims 12, 13, 15, 16, and 19 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,282,881 to Baldock et al. (“Baldock”) in view of U.S. Patent No. 6,155,965 to Santen et al. (“Santen”). Applicants respectfully traverse. Applicants submit that the combination of Baldock and Santen fails to render obvious all of the limitations of claim 12.

Amended claim 12 recites a process for the valorisation of metal values in a Zn-, Fe- and Pb-bearing residue. The process comprises subjecting the residue to a flash or agitated bath fuming step, thereby producing an Fe-bearing slag and Zn- and Pb-bearing fumes. The Zn- and Pb-bearing fumes are extracted and Zn and Pb are valorized. Either one or more of CaCO₃, SiO₂, and MgCO₃ are added as a flux before or during the fuming step to obtain a final slag composition wherein the following relationship is present:

$$\frac{[Fe]}{[SiO_2]} + \frac{[CaO]}{[SiO_2]} + \frac{[MgO]}{3} > 3.5;$$
$$0.1 < \frac{[CaO]}{[SiO_2]} < 1.3; \text{ and}$$

$$6 < [SiO_2] < 22,$$

with all concentrations being expressed in weight percent.

Baldock discloses a single-stage process for smelting metallurgical waste material having an iron compound, a heavy metal, and a toxic element. However, the Office Action states that Baldock fails to disclose or reasonably suggest the slag composition recited in claim 12. The Office Action cites Santen for disclosing a process for producing a leaching resistant slag from fly ash, wherein the slag that is produced has a ratio of CaO/SiO₂ that is regulated to be less than 1.2. Applicants submit that even if Santen discloses slag having a ratio of CaO/SiO₂ of less than 1.2, such disclosure does not render claim 12 obvious.

Claim 12 requires a slag composition satisfying three relationship equations, thus a slag having a composition that satisfies only one of the three equations fails to disclose or reasonably suggest the slag composition recited in claim 12. Further, the only slag composition disclosed in Santen that contains SiO₂ and MgO fails to disclose the slag composition recited in claim 12. In Santen, Table 4 provides the weight percentage of chemical compounds and elements in a leaching resistant slag. According to Table 4, SiO₂ is 32 wt%, FeO is 3 wt%¹, CaO is 33 wt%², and MgO is 4 wt%. Below, Applicants have used

¹ 3 wt% FeO corresponds to about 2.5 wt % Fe, which will be used in the calculations.

the values provided in Table 4 of Santen in the equations recited in claim 12 to determine that the slag of Santen fails to disclose the slag composition recited in claim 12.

Relationship 1: $2.5/32 + 33/32 + 4/3 = 2.4$, which is not greater than 3.5 as required by claim 12

Relationship 2: $33/32 = 1.3$, which is between 0.1 and 1.3 as required by claim 12

Relationship 3: **32** is not between 6 and 22 as required by claim 12.

As indicated above, even if Santen discloses one of the three slag composition requirements of claim 12, such disclosure fails to render the slag composition recited in claim 12 obvious and thus fails to render claim 12 obvious. In fact, Santen provides evidence that the slag composition recited in claim 12 is far from obvious but rather unpredictable and difficult to obtain because Santen shows that meeting one of the three requirements does not ensure meeting the other two. Thus, even if the process of Baldock was altered to regulate the CaO/SiO₂ ratio to be less than 1.2 as disclosed in Santen, the modified process of Baldock still would not render the process of claim 12 obvious because all of the limitations of claim 12 would not be present in the modified process. Based on the foregoing, Applicants respectfully request reconsideration and withdrawal of the instant rejection.

Claim 14 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Baldock in view of Santen as applied to claims 12 and 13, and further in view of U.S. Patent No. 4,072,503 to Petterson et al. (“Petterson”). Applicants respectfully traverse. Combining the disclosures of Baldock and Santen with the disclosure of Petterson fails to overcome the deficiencies present in the combination of Baldock and Santen because Petterson also fails to disclose a slag composition meeting the requirements of claim 12. As such, Applicants assert that Baldock and Santen in combination with Petterson fail to make obvious the invention of claim 14. Accordingly, Applicants respectfully request reconsideration and withdrawal of the instant rejection.

Claim 20 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Baldock in view of Santen as applied to claim 12, and further in view of Derwent Acc-No. 1989-368692 for SU 1048810 and DD 271238 (SU ‘810). Applicants respectfully traverse.

² Given the fly ash feed, Applicants surmise that CO in Table 4 is a typographical error and that CO is actually intended to be CaO.

Combining the disclosures of Baldock and Santen with the disclosure of SU '810 fails to overcome the deficiencies present in the combination of Baldock and Santen because SU '810 also fails to disclose a slag composition meeting the requirements of claim 12. As such, Applicants assert that Baldock and Santen in combination with SU '810 fail to make obvious the invention of claim 20. Accordingly, Applicants respectfully request reconsideration and withdrawal of the instant rejection.

Allowable Subject Matter

The Office Action indicates that claims 17 and 18 have been objected to as being dependent on a rejected base claim, but would be considered allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

For the foregoing reasons, claim 12 and claims 13-20, which depend therefrom, are considered to be allowable. A Notice to this effect is respectfully requested. If any questions remain, the Examiner is invited to contact the undersigned at the number given below.

Respectfully submitted,

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